DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites that "stopping a fluid solution in the capillary tube adjacent to the plurality of stationary sensors by diverting the fluid solution to a waste port." It is unclear how diverting the solution will cause the fluid solution in the capillary solution to stop.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/17104 to Lee in view of U.S. Patent No. 5,141,609 to Sweedler et al.

4. For claim 1, Lee teaches a stop flow method in a liquid chromatography apparatus comprising stopping the flow of the eluate (p. 4, line 20) which would result in the fluid solution in the capillary tube (Figure 1, chromatography column 10) to stop also. Lee also teaches employing a three way valve (p. 15, lines 6-7) which diverts the fluid solution to a waste port (p. 15, lines 24-27). Lee does not teach any of the other elements of claim 1. Sweedler et al. teach a method for improving the quality of a signal in a fluid-based separation scheme by employing a plurality of sensors (col. 2, lines 1-11), said sensors being stationary relative to a capillary tube (claim 1, "array is aligned with the detection zone). Sweedler teaches that the method comprises sensing information about the solution with at least some of the plurality of stationary sensors (col. 2, lines 8-13). Sweedler teaches a method of operating on signals from each of the at least some of the plurality of stationary sensors using an operation selected from a group consisting of integration (col. 5, line 24), summation (col. 12, lines 2-5), and statistical correlation ("weighing factors" col. 11, lines 64-67) to create a signal with greater signal to noise ratio than any of the individual plurality of signals (col. 11, lines 54-55). Then Sweedler teaches using said signal with greater signal to noise ratio to produce an electropherogram (col. 12, line 6). Sweedler teaches that the invention is applicable to capillary chromatography as well (col. 4, lines 67-68), in which case the resulting signals form a chromatogram. One having ordinary skill in the art would have

combined the detection method using an array of detectors in Sweedler in to the method of stop flow liquid chromatography of Lee since this would allow an increase in signal sensitivity without sacrificing the resolution of the detected signal.

5. For claims 2 and 3, Lee and Sweedler teach the elements of claim 1. Lee teaches pumping liquid scintillation fluid. Lee does not teach that it would act as a leading edge indicator when it is in the neighborhood of a predetermined sensor as taught in Sweedler. It would be obvious that this liquid would have its own unique peak or solvent spike. When it is detected by the sensors taught in Sweedler, it would have been obvious to one of ordinary skill to divert the fluid solution to the waste port of the three way valve since there is a controller for the valve as taught in Lee (p. 15, lines 6-7).

6. For claim 4, Lee teaches pumping a non-radioactive solvent (p. 10, line 27) to remove any residual radioactivity out of the column. The radioactive solvent would have a significantly different optic characteristic when compared to a remainder of the fluid solution (non-radioactive solvent).

7. For claim 5, Lee/Sweedler teaches using an array of 516 by 516 detector elements (col. 5, line 7) which is a predetermined number of sensors used as the at least plurality of sensors.

8. For claim 6, Lee/Sweedler teaches that the operated on signals are assembled into an electropherogram or a chromatogram depending on if the data is coming from either a capillary electrophoresis or capillary chromatograph (col. 2, lines 9-10).

9. For claim 7, Lee/Sweedler teaches that the invention is applicable to radiation detection techniques including fluorescence (col. 5, lines 1-5), in which case it would be obvious to use photocells and the detecting means.

10. For claim 8, Lee teaches that valve 47 is used to stop the flow of solution (p. 7, line 7-8) and a three way valve to divert the solution to a waste container (p. 15, lines 24-27). It would be inherent that the pressure of the fluid solution is relieved when the fluid solution is diverted to the waste port of the three way valve since this would allow the solution to flow freely again and a flow of said fluid solution would stop when the pressure is fully relieved.

11. For claim 9, Lee teaches a capillary separation scheme employing a capillary tube in which fluid flows (p. 20, lines 21-22, 30-31) comprising a three way valve comprising a port operably connected to the capillary tube (see Figure 2, capillary tube 33, operably connected by line 32 and 45 to three way valve 18) and a waste port (see Figure 2, valve 18 connected to waste container 20), said three way valve diverting a flow of a solution to a waste port of said three way valve (p. 15, lines 24-27). It does not teach the other elements of claim 9 related to the apparatus for improving a quality of a signal. Sweedler et al. teach an apparatus for improving the quality of a signal in a separation scheme employing a plurality of sensors (col. 2, lines 1-11), said sensors being stationary relative to a capillary tube (claim 1, "array is aligned with the detection zone). Sweedler teaches that the apparatus senses optical information about the solution with at least some of the plurality of stationary sensors (col. 2, lines 8-13, col. 5, lines 12-16). Sweedler teaches a calculation unit which operates on signals from each

of the at least some of the plurality of stationary sensors (col. 11, lines 10-14) using an operation selected from a group consisting of integration (col. 5, line 24), summation (col. 12, lines 2-5), and statistical correlation ("weighing factors" col. 11, lines 64-67) to create a signal with greater signal to noise ratio than any of the individual plurality of signals (col. 11, lines 54-55). It would have been obvious to one having ordinary skill in the art to combine the apparatus for improving a quality of signal in a capillary separation scheme using an array of detectors in Sweedler with the apparatus for stop flow liquid chromatography of Lee since this would allow an increase in signal sensitivity when analyzing a capillary tube.

12. For claims 10 and 11, Lee teaches a stop-flow apparatus for pumping liquid scintillation fluid which would act as a leading edge indicator when it is in the neighborhood of a predetermined sensor as taught in Sweedler. This liquid would have its own unique peak or solvent spike. When it is detected by the sensors taught in Sweedler, it would have been obvious to one having ordinary skill in the art to divert the fluid solution to the waste port of the three way valve since there is a control arrangement which can start the flow of liquid (p. 12, lines 33-34).

13. For claim 12, Lee teaches a stop flow apparatus which pumps a non-radioactive solvent (p. 10, line 27) to remove any residual radioactivity out of the column. The radioactive solvent would have a significantly different optic characteristic when compared to a remainder of the fluid solution.

14. For claim 13, Lee/Sweedler teaches using signal with greater signal to noise ratio to produce an electropherogram. Sweedler teaches that the invention is applicable to

capillary chromatography as well (col. 4, lines 67-68), in which case the resulting signals form a chromatogram.

15. For claim 14, Lee/Sweedler teaches that the invention is applicable to other radiation detection techniques such as absorption and fluorescence (col. 5, lines 1-5), in which case the plurality of sensors would comprise photocell sensors.

Conclusion

16. US Patent No. 5,591,644 was listed in the international search report as particularly relevant, however, it was not used for rejection since it does not contain the step of "diverting the fluid solution to a waste port of the three way valve" as stated in claim 1.

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent No. 5,636,017 to Bruno et al. teach an optical detection arrangement for detecting light coming from a capillary tube. US Patent No. 5,303,021 to Kita teach an optical detector for capillary chromatography using an array photodetector.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID CHONG whose telephone number is (571)270-3718. The examiner can normally be reached on Monday through Friday, 7:30 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on 571-272-1303. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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